

Claims

1. A casting method characterised in that the casting mould is formed by blocks (4) which circulate caterpillar-like on a transport means around a casting caterpillar (2;3) and are held at least on a portion t of the circulation path U on said transport means by means of stationary magnets.
2. A casting method as claimed in claim 1, characterised in that the mould comprises an upper and a lower casting caterpillar (2;3).
3. A casting method as claimed in claim 1 or 2, characterised in that the ratio between the portion t on which the blocks (4) are held on the transport means by means of stationary magnets and the total circulation path U of the at least one casting caterpillar (2;3), $t : U$, is between 0.55 and 0.95.
4. A casting machine (1) for carrying out the method as claimed in one of claims 1 to 3, characterised in that the continuous fabrication of billets and bands of metallic and non-metallic materials is done with a mould in which at least one wall consists of blocks (5) which circulate caterpillar-like around at least one casting caterpillar (2;3), characterised in that the blocks (4) lay loosely on a transport means, preferably a chain (20), so that upon temperature changes they may be deformed in all directions, said blocks being pulled at least on a portion of the circulation path of the at least one casting caterpillar (2;3) by means of stationary magnets against the tracks (31) and guided by the transport means so that the blocks (4) are movable in a contactless manner over the stationary magnets.
5. A casting machine (1) as claimed in claim 4, characterised in that the magnets are permanent magnets or preferably electromagnets.
6. A casting machine (1) as claimed in claim 5, characterised in that as magnets a number of separate magnets are provided.

7. A casting machine (1) as claimed in any of the claims 4 to 6, characterised in that

A) the blocks (4) extending over the width of the mould consist, in the lateral direction, of several block elements (5) which are positioned in frames made of a ferromagnetic material (7) and are preferably held together by means of drawbars (16) provided with tension springs (15) in such a way that, upon temperature changes occurring during the casting process, they may be freely deformed;

B) the blocks (4) put together by means of the frames (7) rest on the casting caterpillars (2;3) as a unit and without any mechanical fixation,

C) at least one stationary magnetic rail (12) being arranged between the tracks (11) of the transport means and the bottom surface of the at least one casting caterpillar (2;3) and at least one stationary magnetic bow (13) being arranged on the entry side and on the exit side (19a;19b) of the mould, by which the frames (7) carrying the block elements (5) are pulled onto the tracks (11) by means of the transport means and are guided thereon in such a way that the frames (7) are movable in a contactless manner over the stationary magnetic rails (12) and magnetic bows (13).

8. A casting machine (1) as claimed in any of the claims 4 to 7, characterised in that over the width of the mould several transport means, preferably chains (20) are arranged, the lateral distance ("j") therebetween being such that any undue bending of the frames (7) placed on the transport means and thus of the composite blocks (4) extending over the width of the mould is avoided, so that due to the low degree of deformation of the block elements (5) and to their maintained, planar position within the frames (7) the walls of the mould, disregarding its length and its width, remain practically even, in spite of the heating of the blocks (4).

9. A casting machine (1) as claimed in any of the claims 4 to 8, characterised in that at least on a portion of the top surface of the machine

bodies the blocks (4) lie free on the transport means (20) and can be removed and replaced without any additional expenditure in time and labour in the course of an exchange operation carried out by means of a hoisting equipment provided with an adequate gripper.

10. A casting machine (1) as claimed in any of the claims 4 to 9, characterised in that the frames (7) are made of a ferromagnetic material.

11. A casting machine (1) as claimed in any of the claims 4 to 10, characterised in that the transport means are chains (20).

12. A casting machine (1) as claimed in any of the claims 4 to 11, characterised in that the transport means are provided with rollers (10).

13. A casting machine (1) as claimed in any of the claims 4 to 12, characterised in that the length of the block elements (5), as measured in the lateral direction, is 25 cm ("h") at the most.

14. A casting machine (1) as claimed in any of the claims 4 to 13, characterised in that the distance between the transport means carrying the frames (7) is 30 cm ("j") at the most.

15. A casting machine (1) as claimed in any of the claims 4 to 14, characterised in that it has a horizontal or a slightly inclined casting direction and comprises a lower casting caterpillar (3) and an upper casting caterpillar (2), the lower casting caterpillar (3) having a length ("k") and the upper casting caterpillar (2) having a shorter length ("l") and being disposed in such a way that at the exit side of the mould, the lower casting caterpillar (3) juts out with respect to the upper casting caterpillar (2), thus making it possible to exchange also the blocks (4) of the lower casting caterpillar (3) in an analogous manner to those of the upper casting caterpillar (2) without any hindrance by gradually moving them onto said extended portion.

16. A casting machine (1) as claimed in any of the claims 4 to 15, characterised in that

a) the two casting caterpillars (2;3) each comprise two shafts (29a;29b;29c;29d) having concentrically fixed chain wheels (30);

b) the magnetic bows (13) being positioned by means of plain bearings or rolling bearings (28) on the rotating shafts (29) of the chain wheels (30), which makes it possible to ensure the required concentricity of the magnetic bows (13) with the track (11) of the transport means, as well as the precise position of these parts with respect to the machine bodies.

17. A casting machine (1) as claimed in claim 15 or 16, characterised in that on the portion of the lower casting caterpillar (3) jutting out with respect to the upper casting caterpillar (2), a secondary cooling appliance for the cast product is provided which can be removed when the blocks (4) are changed.

18. A casting machine (1) as claimed in any of the claims 4 to 17, characterised in that the blocks (4) have a rear surface facing the tracks (11) and that a cooling appliance for said rear surface of the blocks (4) is provided.

19. A casting machine (1) as claimed in any of the claims 4 to 18, characterised in that the blocks (4) have a front surface which forms the wall of the mould and which is provided with a heat-insulating protective layer, preferably made of a ceramic material.

20. A casting machine (1) as claimed in any of the claims 4 to 19, characterised in that the blocks (4) have a front surface which forms the wall of the mould and which is provided with a wear-resistant protective layer, preferably made of a ceramic material.

21. A casting machine (1) as claimed in any of the claims 4 to 20, characterised in that the blocks (4) have a front surface which forms the wall of

the mould and which is provided with a film made of titanium or steel and/or its alloys, preferably with a thickness of less than 0.5 mm.

22. A casting machine (1) as claimed in any of the claims 3 to 20, characterised in that a cooling appliance for the blocks (4) is provided which comprises a plurality of nozzles (9) that are oriented in such a way that the coolant jets (34) impart an impulsion in, or if necessary against, the casting direction to the blocks (4), depending on the most advantageous casting direction, which is imposed by the type of casting process used, in order to optimise in this way the clamping force between the successive rows of blocks.

23. A casting machine (1) as claimed in any of the claims 4 to 22, characterised in that it comprises a drive for the blocks (4) which is provided on the upper casting caterpillar (2) on the exit side (19b) of the mould, an angular momentum against the direction of rotation being imparted to the shaft (29a) on the entry side (19a).

24. A casting machine (1) as claimed in any of the claims 16 to 23, characterised in that it comprises a drive for the blocks (4) which is provided on the lower casting caterpillar (3) on the entry side (19a) of the mould and that an adequate antitorque moment is imparted to the shaft (29d) disposed on the exit side (19b) and supporting the chain wheels (30), so that in the region of the mould the block rows abut on each other and thus come to lie tightly against one another.

25. A casting machine (1) as claimed in any of the claims 11 to 14, characterised in that each chain (20) has chain links (26) connected to one another by means of joints, said joints being provided with a clearance extending in the longitudinal direction so that the pitch of the chains (20) may adapt itself to the dimensions of the blocks (4), both in their cold state and in their heated condition on passing through the mould, and to the toothing of the chain wheels (30).

26. A casting machine (1) as claimed in any of the claims 4 to 25, characterised in that the blocks (4) are offset in their frames (7), so that any interspace arising between the blocks (4) is bridged, and thus the coolant will be prevented from passing onto the front surface of the blocks (4) forming the wall of the mould.

27. A casting machine (1) as claimed in any of the claims 25 or 26, characterised in that the chain links (26) have a tothing which engages with the frames (7) of the blocks (4) so that the position of the latter on the circulating transport means is defined and secured.

28. A method of exchanging the blocks (4) of a casting machine as claimed in any of the claims 4 to 27, characterised in that a plate suspended on a hoisting equipment, provided on its bottom surface with sealings and connected to a vacuum system is let down on the blocks (4) to be exchanged, whereupon the vacuum system is activated so that the blocks (4) are aspirated by the plate and can thus be replaced in a small fraction of the expenditure in time and labour which has so far been necessary for this operation.